Report of the Work of The Rubber Research Board in 1949

(*Established under the Rubber Research Ordinance Chapter* 302)

June, 1950

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The present report is the nineteenth Annual Report of the Rubber Research Scheme (Ceylon) as constituted under the Rubber Research Ordinance (Chapter 302) and amended by the Rubber Research (Amendment) Act No. 27 of 1948.

CHAIRMAN'S REPORT

The constitution of the Board was amended by the Rubber Research (Amendment) Act No. 27 of 1948 with effect from 1st January, 1949, and its personnel at this date was as follows :—

Ex-Officio Members :—

The Director of Agriculture — Mr. D. Rhind, O.B.E. (Chairman).

The Director, R. R. S. — Dr. E. Rhodes (Vice Chairman).

Representing the Minister of Finance — Mr. T. D. Perera, C.C.S., Deputy Secretary to the Treasury.

Nominated Members :—

Representing the Senate — Senator U. A. Jayasundera, K.C.

Representing the House of Representatives — Major Montague Jayewickrema M.P.

Representing the Smallholders — Mr. F. A. Obeyesekera.

Representing the Planters' Association of Ceylon — Mr. H. St. J. Cole Bowen and Mr. F. H. Griffith, M.P.

Representing the Low-Country Products Association of Ceylon — Mr. Francis Amarasuriya and Mr. J. L. D. Peiris.

The following changes in membership occurred during the year :—

Mr. R. C. L. Notley acted for Mr. F. H. Griffith, M.P., during the latter's absence from the island from 1st April to 24th July.

Senator U. A. Jayasundera resigned and Senator C. Wijesinghe was nominated in his place with effect from 16th April.

Mr. H. E. Peries, C.C.S. was deputed to represent the Minister of Finance during the absence from the Island of Mr. T. D. Perera, C.C.S. from 29th July to 28th August, and again to attend the meeting of 16th December.

Committees.—During the year an Experimental Committee was appointed consisting of the Director, one member of the Board and three Visiting Agents representing the three main rubber growing districts of Ceylon. Nominations were not complete by the end of the year and no meetings were held during the year.

London Advisory Committee for Rubber Research (Ceylon and Malaya).—The Board contributed jointly with the Rubber Research Institute of Malaya to the cost of research on the quality and utilisation of raw rubber carried out at the Imperial Institute, London, under the control of the London Advisory Committee for Rubber Research (Ceylon and Malaya).

Meetings of the Advisory Committee and the Technical Sub Committee were held on 25th March, 8th July and 4th November.

Administration.—Dr. E. Phillis, Ph.D., D.Sc., assumed duties as Director with effect from 22nd June, on the departure of Dr. E. Rhodes.

FINANCE.

Income.—The Board's main income was derived from the cess on exports of rubber under section 6(1)a of the Rubber Research Ordinance. Income from this source exceeded the estimate for the year by Rs. 627,781.48. (The estimate was based on the previous cess rate of 25 cents per 100 lbs; the rate was subsequently increased to 55 cents per 100 lbs.).

Monthly cess collections were as follows:—

			B/forward		Rs. 551,875.24
January	...	Rs. 122,698.12	July	...	„ 61,681.35
February	...	„ 119,739.48	August	...	„ 75,113.96
March	...	„ 103,771.71	September	...	„ 91,920.35
April	...	„ 66,897.97	October	...	„ 85,012.50
May	...	„ 65,601.84	November	...	„ 88,979.01
June	...	„ 73,166.12	December	...	„ 93,199.07
		Rs. 551,875.24			Rs. 1,047,781.48

A profit of Rs. 20, 924 was derived from the normal working of Dartonfield Estate and Rs. 23,826 from Nivitigalakele.

Expenditure.—Current expenditure amounted to Rs. 625,451. The surplus of income over expenditure for the year was Rs. 645,822.

Capital expenditure amounting to Rs. 117,078 was incurred mainly in respect of Agricultural Development Rs. 25,071; National Engine Rs. 21,342; Buildings Rs. 32,357. Electric lights to Junior Staff bungalows Rs. 14,885; Water and Power Supply Rs. 4,784; Station Waggon and Garage Rs. 12,095; Furniture, Equipment and Laboratory Apparatus Rs. 5,044; Hedigalla Cart Road Rs. 1,500.

Accounts.—The accounts for the year with a Balance Sheet showing the property and liabilities of the Board have been prepared and submitted to the Auditor-General for examination.

Technical Reports.—The Director's report, which embodies the reports of the other officers, is attached.

(Sgd.) D. RHIND,
Chairman of the Board,
Rubber Research Scheme (Ceylon).

7th March, 1950.

DIRECTOR'S REPORT

The year brought further changes in staff. Dr. E. Rhodes, Director, resigned late in 1948 and left Ceylon in June, 1949. He was succeeded by Dr. E. Phillis, D.Sc., who arrived in Ceylon a few days before Dr. Rhodes left.

Dr. H. E. Young, D.Sc. was appointed Oidium Research Officer and arrived in Ceylon early in July.

Mr. C. A. de Silva, Botanist, was on duty throughout the year, and it is to be noted that he is the Scheme's only link with scientific work carried out in previous years.

Mr. W. I. Pieris, Small Holdings Propaganda Officer, was on duty throughout the year.

Two Research Assistants Messrs. M. S. Wijeratne and D. M. Fernando, appointed late in 1948, were on duty throughout the year.

In recent years the Scheme has lost the following officers :—

Mr. T. E. H. O'Brien, Director, resigned (ill health) 1946.
Dr. E. Rhodes, Director, resigned (ill health) 1948.
Mr. C. C. T. Sharp, Botanist, resigned 1945.
Dr. C. E. Ford, Geneticist, resigned 1945.
Mr. M. W. Philpott, Chemist, resigned 1948.
Mr. C. G. Hansford, Mycologist, resigned 1948.
Dr. L. A. Whelan, Soil Chemist, resigned 1948.

To offset these losses, another Director has been appointed and a special contract officer has been recruited to investigate Oidium. Against the five resignations of Senior Officers there is not even one new appointment to record.

Attempts to recruit Senior Staff have so far not been successful — there is a world wide dearth of specialists. It is hoped that matters will improve during 1950.

To complete this sorry story it must also be recorded that during this period most of the Scheme's better technical assistants left for other, more lucrative or more congenial posts.

This depleted staff position is extremely unfortunate at the present time. The very smallness of the Rubber Research Scheme (Ceylon), has in the past dictated that its efforts should, in general, be directed to the application in Ceylon of fundamental results obtained elsewhere especially in Malaya. The wave of independence currently spreading throughout the East indicates that Ceylon may have to stand much more firmly on its own feet in the future.

The past year has been noteworthy in that world production fell short of the previous year by approximately 3 per cent (total production in S. E. Asia 1,412,500 tons) and was some way below the record of 1941 (1,554,000 tons). This shortage has had a very beneficial effect on price levels.

An appreciable part of the rubber in the East is not being fully tapped, due to labour shortages and to political activities, and so the potential Eastern production of Hevea must be well over 2,000,000 tons of which Ceylon's contribution is approximately 100,000 tons, or 5 per cent.

In spite of this huge potential production, there are strong indications that there will be a market for much, if not all of this rubber. Intensive research is going on in the U.S.A., in England, in Holland and in France on new uses for rubber and some of the new outlets appear very promising, e.g. foam rubber and rubber in roads.

This is a period of resurgence in the natural rubber industry, both in its production and in its use. It is highly probable that an increasing volume of rubber will be shipped as concentrated latex; and that solid rubber will no longer be sold simply on its appearance, but on its physical properties such as cleanliness, hardness, rate of vulcanisation, etc.

The days when the price of rubber could be controlled through production limitation agreements are gone for ever, since synthetic rubber will step into the field if the price of natural rubber goes too high. If there is ever a surplus of natural rubber — as appears possible in the not too distant future, it is the specification rubber that will hold the market, while ungraded rubber will sell only at a discount.

In face of this outline of future developments, it is urgently necessary that the Rubber Research Scheme should have the strongest possible staff to ensure Ceylon's place in the rubber market of years to come.

The present policy of the Rubber Research Scheme may be summed up as follows:—

(1) To ensure that the best possible use is made of the latex now produced whether by estates or by small holders: in other words, to see that the maximum percentage of top grades is obtained.

(2) To devise and test agricultural systems which allow of continued high production at minimum cost. This inevitably includes studies on soil conservation and soil fertility.

(3) To produce through selection and plant breeding higher yielding clones and higher yielding clonal seed with the primary object of reducing production costs. If natural rubber is to survive competition with the synthetic product, it is more essential at present to produce rubber *cheaply* than to produce vast quantities at a high cost.

(4) To discover and test clones which are resistant to diseases such as Oidium, Brown Bast, etc.

(5) To investigate the preparation of new types of rubber direct from latex.

The following reports have been prepared, where possible, by the head, or acting head of the Department concerned:—

BOTANICAL AND MYCOLOGICAL DEPARTMENT.

Botanical.—(C. A. de Silva).

Planting Material.

Approximately 3,500 trees were test-tapped in various experimental clearings at Dartonfield and Nivitigalakele. Approximately 24,000 clonal seedlings were established in nurseries at Nivitigalakele from collections made in the off season from the Moneragalla district and from normal collections made in August-September, 1949. The material represents near legitimate seed from 9 approved sources of clonal seed on Ceylon estates

from clones PB. 86, TJ. 1, BD. 5, TJ. 16, PB. 25, Av. 49 and 157. Over 10,000 seeds come from large monoclonal blocks of clone TJ. 1, which should contain a fair proportion of selfed seed. A large scale clonal seedling trial will be planted with this material representing clonal families from various sources, and the remainder will be distributed through the Small Holdings Department.

25 new clones, established mostly from high yielding Prang Besar and Tjikadoe seedlings planted in 1932, and 1935 at Nivitigalakele, were planted out in a large scale clone trial at Hedigalla in July 1949. The total area was approximately 30 acres. Clones RRIM. 501, 513, 514, PB. 86, PB. 6/50 and LUN.N. were used as Controls.

No. 3 Replanting Experiment, Dartonfield, 1936.

This experiment was continued for assessing the yields of trees planted as stumped buddings and budded stumps. In the latter half of 1949 one of the original 4 blocks of this experiment was eliminated and yields for 1949 are based on 3 blocks. The stumped buddings were first tapped in March, 1942 and budded stumps in December, 1942. Budding in the field as a third method of planting was carried out on seedlings, planted in September, 1936, and budgrafted 12 to 16 months later. Experimental tapping was carried out once a month and girth measurements were taken in June. The results are summarised in Table I.

TABLE I.

Material	Age in years June 1949	Mean Girth in Inches			Yield tree/tapping in grams
		1948	1949	Increase* 1948/49	
Stumped buddings	13	30·67	31·07	0·40	30·7
Budded stumps	13	30·16	30·67	0·51	29·1
Field buddings	11½	27·12	27·64	0·52	22·5
Sign. diff. (.05)		1·49	1·19	—	—

*Due to the use of a new measuring tape in 1949 increment figures for 1948/49 should be corrected by a value of + ·36 ins. for the 3 systems of planting.

As can be expected the yields of field buddings are behind those of the other 2 systems of planting. The difference in yield between stumped buddings and budded stumps is of no practical importance.

Under the present replanting costs the yield and growth results over 8 years tapping in this experiment indicate that the use of budded stumps compared with stumped buddings will be the more economic proposition.

1938 Replanted Area, Dartonfield (No. 2 Manuring Experiment).

This experiment with 6 monoclonal blocks is essentially a manuring experiment with budded rubber. The yields of clones in this area tapped

from March, 1944, are of considerable interest and the results for 1949 are summarised under :—

Clones	TJ.1	PB.183	W.259	HC.28	PB.86	PB.186
Yield in lbs. per tree per year (140 tappings)	12.6	7.1	7.3	8.3	11.4	10.2

Clones TJ. 1 and PB. 86 recommended for large scale planting show the better yields. The latter has come into favour in recent years for yield and latex colour.

1939 Replanted Area, Dartonfield.

A small trial of imported Prang Besar 'fraction' clones is carried out in this area of 2 acres. The results of test-tapping once a month are summarised under for 5 years :—

Clone	Tapping commenced	No. of trees tapped 1949	Yield in lbs. per tree per year 140 tappings				
			1945	1946	1947	1948	1949
PB. 6/9	Mar. '44	45	6·5	6·4	8·0	7·8	13·1
PB. 5/60	Sep. '44	28	5·8	6·3	8·9	10·8	11·6
PB. 5/139	Mar. '45	29	4·1	4·4	6·3	6·1	8·7
PB. 6/50	Sep. '48	9	—	—	—	—	9·1

Clone PB. 6/9 is highly susceptible to Oidium leaf disease in this country and will not be recommended on this account. The yields of the other clones are satisfactory but unfortunately these clones do not produce the required white colour in the manufactured crepe.

Stock Experiment, Dartonfield, 1941.

The 5 blocks of this experiment are planted with RRIM clones 500, 501, 506, 520, and 514. In each monoclonal block there are 6 different stocks replicated 16 times. These include a control of unselected seedlings and illegitimate seedlings of clones TJ. 1, AV. 163, BD. 10, BS. 3, and MK. 1/1.

A sixth block is planted with unbudded seedlings of the 6 stock families used, which are replicated 16 times in single tree plots. A summary of the girth measurements taken in June, 1949 is given in Table II.

TABLE II.

Mean Girth in Inches, 1949.

Stock families	TJ. 1	AV. 163	BD. 10	BS. 3	MK. 1/1	Unselected	Sign. diff. (·01)
Scion growth	20·3	21·4	20·3	20·7	21·0	20·8	Not sign.
Seedling families	25·2	29·3	26·1	25·3	25·7	24·9	3·9

The unbudded seedlings of clone AV. 163 show the best growth. The indications of better growth of scion on these stocks are not confirmed by the statistical analysis.

The RRIM clones in this area have been in tapping since March, 1948, and the results of sample tapping once a month are given under for 1949.

Clones	RRIM.500	RRIM.501	RRIM.506	RRIM.520	RRIM.514
No. of trees tapped	90	94	93	82	45
Yield in lbs. per tree per year on 140 tappings.	8.5	10.3	10.3	7.9	8.0

Clone RRIM. 501 is considered the best of the above series both for yield and secondary characters. RRIM. 506 is susceptible to Brown Bast and has a late-dripping habit.

Stem and Branch Budding Experiment, Hedigalla, 1944.

This experiment was designed to observe variations of buds taken from main-stem and branches of parent seedling plants. H1 and H2 represented budgrafts of the lower and upper sections of main stem respectively and B. branch budgrafts. A split plot design was adopted with ten clones, 3 types of budgrafts, and 5 replications. Girth measurements taken in 1948, and 1949 are summarised in Table III.

The girth figures show no significant differences between the 3 types of budgrafts. Observations made in November 1949, show that 50 per cent of the 'H1' series and about 20 per cent of the H2 series are beginning to develop corky bark compared with the 'B' series, which are smooth barked. These observations will be confirmed, when the trees are taken into tapping.

TABLE III.

Budwood type	Mean Girth in Inches		Increase 1948/49.
	1948	1949	
H1	10·2	13·7	3·5
H2	9·8	14·1	4·3
B	10·1	13·9	3·8

1939 Clone Trial, Field 6A, Nivitigalakele.

37 new local clones and 7 control clones which have been planted on a large scale in Ceylon are tested in this area. The layout consists of 20 polyclone blocks with 44 clones planted in single tree plots. In the first 3 years of experimental tapping 8 clones were selected for further trial on a large scale. Budwood of the first 4 selected clones NAB. 15, 16, 17 and 20 have been distributed to a number of estates for use in small scale trials. The yield results and growth measurements of the 8 selected clones are summarised in Table IV, together with the cases of Brown Bast,

Clones NAB. 3, 15 and 20 seem to be the most promising for yield, colour of manufactured crepe, and resistance to early Brown Bast. Clone NAB. 3 is not such a vigorous grower compared with the other NAB. clones but it shows a very satisfactory yield increase in 1948/49.

TABLE IV.

1939 Clearing, Field 6A, Nivitigalakele.

Tapping system S/2, d/2, 100%; 2 sample tappings per month

Clone	No. of trees tapped	Yield in lbs. per tree per year 140 tappings					Mean girth in inches Jan.	Brown Bast cases
	1949	1945/46	1946/47	1947/48	1948*	1949	1950	
NAB. 3	19	2·9	4·1	6·0	10·1	12·1	24·8	3
,, 8	20	2·9	4·5	7·9	9·1	11·0	29·4	6
,, 11	19	2·7	4·8	7·2	10·0	10·8	27·3	3
,, 12	19	3·0	5·0	8·5	12·4	13·3	28·8	1
,, 15	20	4·4	6·8	11·6	12·8	15·9	29·8	1
,, 16	20	5·1	6·6	9·4	9·5	10·8	25·1	—
,, 17	20	5·1	7·9	12·2	13·6	15·2	29·2	6
,, 20	18**	3·4	6·3	10·2	16·6	15·5	30·9	2
Controls								
MK. 3/2	16	2·1	4·0	5·7	7·5	9·9	28·9	4
WG.6278	19	3·4	4·6	6·9	6·9	7·9	25·1	1
GL. 1	20	4·0	4·8	7·0	8·1	9·2	24·7	2
PB. 86	20	3·9	6·1	8·4	9·8	13·2	27·8	1
TJ. 1	19	2·6	4·7	5·9	9·6	11·3	27·0	2

* Calculated on 10 months (March to December 1948).

** 2 trees uprooted by wind.

1940, Clone Trial, Field 6B, Nivitigalakele.

Foreign clones of promise are tested under local conditions in this experiment. 4 control and a few new local clones bring up the total to 36. 4 tree plots are replicated 6 times for each clone giving a total of 24. The trees were taken into tapping in January, 1947. The yields and growth measurements are summarised in Table V, together with the cases of Brown Bast in the first 3 years of tapping.

Clones AV. 255 and PR. 107 have given very satisfactory yields in the third year of tapping compared with clones GL. 1 and TJ. 1. Both these clones have been recommended for large scale planting in Java and Sumatra in 1948/49, and must now be seriously considered for planting on a large scale in this country. Unfortunately we have still no information of the performance of these clones on outside estates, where small scale testing has been carried out. AV. 255 and PR. 107 produce a very satisfactory 'white' crepe especially the latter. Clone PR. 107 is however known to be susceptible to somewhat severe attacks of Oidium leaf disease.

Two RRI. 500 series clones, named RRIM, in this clearing, are also outstanding in yields. We hope to distribute budwood of these clones to outside estates in 1950, especially material of RRIM. 501 for which we have had several applications.

Clone LUN.N. shows a satisfactory increased yield in 1949, but is not up to the standard of the clones referred to earlier.

TABLE V.

1940 Clone Trial, Field 6B, Nivitigalakele.
Tapping system S/2, d/2, 100%; 2 sample tappings per month

Clone	No. of trees tapped	Yield in lbs. per tree per year 140 tappings.			Mean girth in inches Jan.	Brown Bast cases
	1949	1947/48	1948*	1949	1950	
NAB. 26	24	6·4	7·8	8·8	24·8	1
RRIM. 511	22	5·9	6·4	7·3	22·4	3
PB. 6/50	22	5·9	7·6	8·9	27·4	1
RRIM. 513	23	5·8	9·9	11·2	22·0	3
RRIM. 500	22	5·6	6·7	7·1	22·7	1
AV. 255	24	5·6	8·7	9·9	27·7	1
RRIM. 501	21	5·4	8·8	11·7	22·8	2
RRIM. 504	24	5·1	7·5	8·0	22·1	—
RRIM. 506	18	5·1	7·2	6.6	22·8	6
RRIM. 514	24	4·9	5·8	7·1	19·8	3
PR. 107	24	4·7	7·9	10·1	23·8	—
PR. 106	23	4·5	4·9	6·7	24·2	1
RRIM. 519	21	4·5	6·5	7·1	22·8	3
PB. 5/57	22	4·4	5·9	6·6	22·6	6
WAR. 4	24	4·2	6·6	7·3	24·4	—
PR. 105	24	4·2	6·9	8·4	22·5	—
BD. 17	20	4·1	4·5	5·3	22·8	1
B. 6	24	4·0	4·3	5·1	24·2	2
B. 7	23	4·0	5·2	6·4	21·8	1
NAB. 24	24	4·0	6·1	8·2	23·4	—
LUN. N	21	3·8	7·5	8·2	24·1	2
B. 1	24	3·9	6·6	8·0	28·3	—
PIL. B. 84	23	3·5	4·9	5·8	24·4	3
KD. 1	23	3·5	3·7	4·6	23·0	4
B. 13	23	3·3	3·5	4·3	23·6	1
B. 3	22	3·2	4·5	6·0	21·5	—
RRIM. 518	24	3·1	4·1	4·7	20·9	—
Parawatta 1	23	3·0	4·5	6·4	23·3	—
MK. 1/3	21	2·8	4·7	6·2	24·8	1
NAB. 25	21	2·8	4·5	6·2	23·8	1
AV. 352	22	2·6	5·6	7·7	26·2	1
PIL. D. 65	23	2·4	3·5	4·4	21·1	—
Controls						
GL. 1	22	5·1	6·9	7·4	23·1	1
HC. 28	23	4·3	6·1	8·3	28·9	1
WG. 6278	24	3·9	6·1	6·5	22·7	—
TJ. 1	24	3·8	6·6	8·1	24·8	4

*Calculated on 10 months tapping (March to December, 1948.)

1941 Clearing, Field 6C, Nivitigalakele.

Hand pollinated seedlings of the 1939 programme are planted in this area with Clone WG. 6278 as a control. Unfortunately the clone has not grown well in the seedling rubber and makes a poor control. 5 tree clones established from a proportion of the seedlings based on 'pricking' tests are planted in an adjacent area. Seedlings and budgrafts were taken into tapping in 1947. The average yields of the seedling families and control clone are given in Table 6A. Table 6B gives the yields of the more promising derived clones compared with the control clone WG. 6278.

Yields of seedling families in Table 6A indicate that clones MK. 3/2, WG. 6278, and BS. 3 are promising seed parents. Clone BS. 3 is particularly useful as a seed parent as it is a prolific seed bearer. Of the 3 clones RR. 108, 153 and 190, which showed good yields in 1948, only RR. 108 has shown a satisfactory increase in 1949. 3 trees of clone 190 are affected with Brown Bast. Budwood of the more promising clones with good secondary characters will be multiplied in 1950 for a large scale clone trial. It should be noted that the yields for the third year of tapping, some of which are outstanding, are based on only 5 tree clones, compared with 20 to 24 tree clones selected from clearings planted in 1939 and 1940.

TABLE VIA.

1941 Clearing, Field 6C, Nivitigalakele.

Tapping on S/2, d/2, 100%; 2 sample tappings per month.

Family	No. of trees tapped	Mean yield in lbs. per tree per year 140 tappings.		
	1949	1947/1948	1948*	1949
BS. 3 x MK, 3/2	49	3·3	6·0	8·2
MK. 3/2 x WG. 6278	3	2·6	6·9	8·0
BS. 3 x PIL. A. 44	37	3·2	4·6	6·5
PIL. A. 44 x WG. 6278	18	2·6	5·1	5·6
BS. 3 x WG. 6278	44	3·6	7·7	10·0
PIL. A. 44 x BS. 3	14	2·6	3·8	5·2
PIL. A. 44 x MK. 3/2	6	3·2	5·9	7·5
WG. 6278 x MK. 3/2	3	3·8	8·1	9·2
BS. 3 x TJ. 1	3	2·7	4·7	6·7
Control clone WG. 6278	39	1·9	3·1	4·4

*Calculated on 10 months tapping (March to December, 1948).

TABLE 6B

1941 Clearing, Field 6C, Nivitigalakele.

Tapping system S 2, d 2, 100%; 2 sample tappings per month.

Clone	Mother tree No. and Seedling Family	Yield in lbs. per tree per year 140 tappings			
		1947/48	1948*	1949	Control WG.6278 1949
RR. 195	183, WG. 6278 × MK. 3/2	5·5	7·9	14·0	6·8
RR. 108	16, BS. 3 × MK. 3/2	6·3	11·2	13·5	4·3
RR. 116	28, BS. 3 × MK. 3/2	4·7	8·3	12·5	6·7
RR. 197	185, BS. 3 × TJ. 1	3·9	8·0	9·4	5·1
RR. 126	41, BS. 3 × MK. 3/2	4·9	8·4	11·6	6·1
RR. 134	50, MK. 3/2 × WG. 6278	3·5	6·6	11·2	2·8
RR. 181	147, BS. 3 × WG. 6278	4·5	8·6	10·8	10·3
RR. 125	40, BS. 3 × MK. 3/2	3·7	6·2	11·5	7·7
RR. 121	36, BS. 3 × MK. 3/2	5·3	6·8	10·8	9·1
RR. 173	129, BS. 3 × WG. 6278	4·1	6·4	9·6	4·5
RR. 146	77, MK. 3/2 × PIL. A. 44	5·0	6·2	9·3	6·0
RR. 184	184, WG. 6278 × MK. 3/2	—	6·3	6·6	6·7
RR. 124	39, BS. 3 × MK. 3/2	4·3	7·3	11·1	7·3
RR. 196	164, WG. 6278 × MK. 3/2	—	6·3	10·3	—
RR. 129	44, BS. 3 × MK. 3/2	3·5	5·6	9·0	6·6
RR. 175	135, BS. 3 × WG. 6278	3·0	4·7	9·2	4·2
RR. 153	91, PIL. A. 44 × WG. 6278	5·9	10·0	10·8	5·1
RR. 163	110, PIL. A. 44 × WG. 6278	4·4	8·0	9·2	5·7
RR. 132	48, BS. 3 × MK. 3/2	4·3	6·4	9·9	7·9
RR. 198	186, BS. 3 × TJ. 1	4·5	5·9	9·1	5·2
RR. 109	17, BS. 3 × MK. 3/2	4·6	6·0	9·4	6·2
RR. 127	42, BS. 3 × MK. 3/2	3·7	6·3	9·1	6·4
RR. 143	72, BS. 3 × PIL. A. 44	3·5	7·3	9·4	5·1
RR. 120	34, BS. 3 × MK. 3/2	3·0	6·2	9·5	4·0
RR. 169	120, BS. 3 × WG. 6278	3·7	6·2	8·5	6·5
RR. 104	12, BS. 3 × MK. 3/2	3·6	5·2	8·6	4·6
RR. 111	21, BS. 3 × MK. 3/2	5·6	8·3	9·6	6·3
RR. 178	142, BS. 3 × WG. 6278	2·8	7·6	8·4	4·8
RR. 123	38, BS. 3 × MK. 3/2	4·2	6·6	8·5	6·9
RR. 119	31, BS. 3 × MK. 3/2	3·4	7·2	9·6	5·1
RR. 128	43, BS. 3 × MK. 3/2	4·3	6·8	8·9	4·6
RR. 182	150, BS. 3 × WG. 6278	2·2	6·5	7·9	5·0
RR. 131	47, BS. 3 × MK. 3/2	3·5	5·6	8·6	4·7
RR. 168	118, BS. 3 × WG. 6278	2·8	6·3	8·8	5·0
RR. 190	177, PIL. A. 44 × MK. 3/2	3·1	9·4	7·0	6·0

* Calculated on 10 months tapping (March to Dec., 1948)

1942 Clearing, Field No. 7, Nivitigalakele.

Clonal seedlings of the 1940 hand pollination programme are planted in this area together with a few illegitimate seedlings of A.V. 185 and clone DAR. 1. Clone WG. 6278 was planted as a control. The trees have grown in a rather depleted soil after the planting of food crops in this area during the war period. The trees were given a further set-back,

when a number of well grown seedlings were cut back for budwood in 1944. Clones established from these seedlings were planted in the 1944 clone trial on an adjacent area.

246 seedling trees were brought into tapping in January 1949. Yield results for 1949 are given in table VII. Control clone WG. 6278 has done particularly well in this clearing. Seedlings from clone BS. 3 crossed with clones TJ. 1 and HC. 28 have given very satisfactory yields in the first year.

TABLE VII.

1942 Clearing, Field No. 7, Nivitigalakele

Tapping system S/2, d/2, 100%; 2 sample tappings per month

Family	No. of trees tapped	Yield in lbs. per tree per year 1949
BS. 3 × HC. 28	67—72	3·0
BS. 3 × TJ. 1	63—70	4·0
MK. 1/3 × BS. 3	6	2·1
MK. 1/3 × MK. 3/2	4—5	2·2
HC. 28 × WG. 6278	2	3·3
MK. 1/3 × WG. 6278	7	2·0
Ill: seedlings AV. 185	10—16	3·0
WG. 6278 Control	62—65	4·5

Report of Research Assistant, Botanical Dept.

(D. M. Fernando).

The writer assumed duties on November 1st 1948.

A large-scale clone trial was laid out at Hedigalla for the testing of 31 clones, including the NAB and Malaya clones, and Tjikadoe and Prang Besar seedlings. The layout was an Incomplete Randomized Block experiment for 31 varieties with six replications of 25 plants each, involving a total of 4650 plants.

In the interests of inter-planting and future losses the system of lining adopted ran at right angles to the gradient — the rows being 45 feet apart on a herring-bone system. Holding 6 ft. × 45 ft. gave a stand of 160 plants per acre. Holes were dug 2½ ft. × 2½ ft. × 1 ft. deep and a further 2 feet in the centre by an alavangoe. Holing commenced in November 1948 and finished in June 1949. Budgrafting of 5,800 stocks at Hedigalla and 1950 stocks at Nivitigalakele commenced in April and was completed in June. Planting was carried out in July in moderate rainfall. A census taken in November gave the percentage of failures as 0.6. Supplies of 20 plants for each of the 31 clones were planted in August.

Crown-budding at Hedigalla at heights of 5 and 8 feet was commenced in March but could not be completed due to budgrafting for the clone trial.

A study was made of the differentiating characters in clonal seed and a brief memorandum submitted. Clonal seeds from Moneragala were planted in Nivitigalakele and a few PB. 86 seedlings showed yellow foliage. A detailed examination was made of the vegetative characters of the four leading NAB. clones, in order to serve as a reference for future identification.

With the incidence of Oidium, detached leaf culture of Hevea leaves was attempted but met with no success. Refoliating twigs enclosed in cellophane bags showed no traces of Oidium: this confirmed in result, though by similar procedure, the observations of the previous Mycologist that the spores were wind-borne. Tentative attempts to germinate and culture isolated spores of Oidium proved unsuccessful. A visit to Kepitigala Estate bore out the immunity of LCB. 870 in contrast to the other severely affected trees of the clone museum.

A detailed study of the bark anatomy of Hevea was made in order to evaluate an early index of yield. The diameter and number of latex vessels were found to have no correlation with yield. The diameter of sieve-tubes was found to be small in low yielding seedlings and even in moderate yielding seedlings with an extensive length of cut, in contrast to clonal rubber which showed consistently high sieve-tube diameter. The general development of phloem was poorer in low-yielders than in high-yielders. However, in accordance with Malayan opinion, no close statistical correlation could be shown between the diameters of sieve-tubes of high-yielding trees exhibiting small differences in yield. LCB. 870 when examined in detail showed large sieve-tube diameter but was characterized by a medullary ray which, in trangential view, was longer than that of other clonal samples; this aspect of bark anatomy is being pursued further. It is proposed, in the investigation of an early index of yield, to ally bark anatomy with the determination of latex content of leaves: preliminary extractions were carried out using Soxhlet extracters and minimum extraction times were determined.

Two stalls, representing the Scheme, were set up and maintained by the Research Assistant, Chemistry, and the writer at the Sessions of the Ceylon Association of Science (Dec. '48) and at an agricultural exhibition organized by the L.C.P.A.

MYCOLOGICAL.—(C.A. de Silva).

Oidium heveae.

The 1949 season in the wet low country districts showed a mild attack of Oidium compared with the severe attack in 1948, especially in old seedling rubber, where only the late wintering trees were badly affected. Many clones which had defoliated more than once in the previous year were able to refoliate satisfactorily without Oidium infection. The most conspicuous in this category was clone Glenshiel 1 at Dartonfield. It is interesting to note that although clone Prang Besar 86 was among the last to refoliate at Dartonfield, the trees were not badly affected. Clone PB. 6/9, a high yielding clone from Malaya came in for repeated attacks of Oidium due to its very late wintering habit. The high susceptibility of this clone to Oidium has been confirmed on a number of outside estates.

Observations on dates of refoliation at the Scheme's sub-stations, which are about 6 miles apart, showed that environment influenced the time of wintering apart from clonal characteristics. Oidium in the actively sporulating condition was found on young seedlings in reservations in early November and December.

The clone museum established at Kepitigalla Estate, Matale, with 59 clones showed that all clones were infected with Oidium, except clone LCB. 870, which wintered for the first time, since it was planted in 1941. This clone refoliated at the same time as the surrounding clones. The somewhat mature leaves, at the time of the writer's visit to the estate,

showed only mild traces of 'secondary' Oidium. These preliminary observations will be checked up by the Oidium Research Officer, appointed in 1949. Clone LCB. 870 has been already distributed to a number of estates for trial against Oidium infection. The clone is unfortunately not a high yielder, although of robust growth. Should the clone be found immune to Oidium under the conditions of growth in Ceylon, crown budding will be necessary with a high yielding centre-section.

Phytophthora.

Pod-set in budded and seedling areas was very poor in 1949. There was, however, a sharp fall of leaves due to Phytophthora infection, during the prolonged rainy period in September. At Dartonfield leaf fall was confined to old seedling rubber of 25 to 35 years of age in certain isolated areas.

Dieback of shoots of young budgrafts was observed on an estate, where the old stand was poisoned with sodium arsenite. About 2 to 3 per cent of the old trees had not been completely killed out in 2 years; as a result there was a prolific seed set on these surviving trees with the development of podrot eventually infecting the shoots of budgrafts planted under the old stand. It is necessary, therefore, to see that all the old trees are completely killed during the first 3 months of poisoning, if necessary with an extra dose of poison.

Fomes Lignosus.

This root disease still remains a matter of considerable economic importance in replanting work. Fomes lignosus in the "dormant" rhizomorphic stage has been identified on the tap-roots of a number of old seedling rubber trees which are being uprooted at Dartonfield. These cases if overlooked will remain as potential sources of infection, when the root-system of the young stand of rubber begins to spread, and the infected logs lie buried under the heavy ground cover. Affected material should not be moved around over the clearing as timber. Every effort should be made to eradicate the disease by burning all infected material in situ. This precaution will be specially necessary in cases of working an outside contract for felling and clearing the old stand of rubber.

Another important case of possible infection from old trees was investigated on an outside estate, where a large acreage had been replanted after poisoning the old trees. With the young budgrafts about 3 to 4 feet high, fructifications appeared at the base of the old trees killed by poisoning, and a good few cases were identified as Fomes lignosus. A note of warning is, therefore, necessary in the poisoning method, which does not kill out Fomes present in the roots of the old trees. Whether the parasitic fungus surviving on dead roots will last out to infect the young stand later will be checked up in this particular clearing, after the possible precautionary measures have been adopted.

The felling of old rubber on contract together with the sale of timber resulting in a considerable saving in replanting costs, should therefore be given preference over the method of poisoning. The poisoning of trees should be undertaken as a last measure, when felling and the sale of timber are not possible, owing to difficulties of transport and inaccessibility of areas for the handling of timber.

Brown Bast.

The light scraping of trees in tapping on the first signs of dryness on tapping cuts has given some encouraging results. The rest after the scraping of the affected area is extended to a maximum period of 6 months, if inspection at 2 monthly intervals shows symptoms of dryness. The light-scraping takes off only the outer layer of 'gritty' bark, and regeneration is sufficiently complete for resumption of tapping after a few months. The scrapped area is treated with a disinfectant after scraping. 25 trees of different clones were treated and 20 trees have come into normal tapping. 5 trees which showed no improvement after the 6 months rest will be given a second round of scraping.

Report of the Oidium Research Officer.

(H. E. Young).

On arrival in Ceylon on July 11th 1949 duty was immediately commenced.

The first necessity was to survey the previous work on *Oidium heveae* carried out in Ceylon and abroad and all available reports and literature were studied and summarized. It was found that the life history of the fungus had been well worked out by Dutch investigators and when translations of their papers in process of being arranged for, become available, it will be necessary to check various key points in regard to behaviour in Ceylon.

Recent work in England on powdery mildews has provided other information concerning conditions necessary for infection in this group and will have to be investigated in relation to *Oidium heveae* in an Oidium season.

The present sulphur dusting appliances were examined and records of their Oidium controlling abilities summarized. In addition all available literature on the effect of various sulphur dusts on this and related fungi was examined.

It soon became patent that the present dusting equipment gave somewhat unsatisfactory results and it seemed that the logical application method for fungus control on the foliage of *Hevea brasiliensis* under the conditions of terrain existing on Ceylon rubber estates would be by means of a readily portable mist blower using a wet spray at high concentration in order to limit the gallonage of water necessary per acre to a practicable figure.

A survey of modern mist applicators showed that although some types would be satisfactory in principle they were either too cumbersome for the work required or too weak to provide the leaf coverage necessary.

One type, the "Portamist," a portable mist blower manufactured in the U. S. A. was ordered and is now in transit for experimental purposes. This machine will be too weak for work on mature rubber but will provide information on the effect of mist sprays on Oidium when it is used on younger trees up to forty feet in height. From the results obtained and further mechanical investigations it should be possible to evolve a machine satisfactory for the purpose in question.

A wet spray of the lime-sulphur type has, in addition to other qualities, better sticking properties than dusts and with a blower of the wind tunnel type it should be possible to direct the spray where required to a greater extent than depending on the vagaries of the wind as in present dusting appliances.

Preliminary investigations have also indicated that it may prove advisable to discontinue the use of elemental sulphur, if practicable, owing to its adverse effects on the soil when applied in any great amount. Sulphur has the effect of acidifying the soil and early indications of severe chlorosis of rubber trees due to high soil acidity have already been observed by the writer. The result of this soil degradation is reflected in the unthrifty growth of the trees. Sulphur dusting without expensive soil treatment to neutralize its effects can only emphasize this soil problem especially when combined with the use of acidic manures.

The tea "blister blight" conference was attended in order to garner information concerning fungicidal applicators and numerous discussions with engineering firms and with overseas scientists concerning dusting and spraying machinery and fungicides have been held. The help of overseas firms and institutions was enlisted and much information obtained therefrom. In general all the specialists consulted agreed with the writer's contention that a mist blower if procurable in a practicable form would provide the most rational applicator of fungicide.

In fact, in the absence of a set plan of work to carry out, a definite line of action is developing which should produce informative results.

The search for Oidium resistant clones has resulted in the selection of one variety which up to date has suffered no leaf fall due to mildew. The foliage is infected to a slight extent but not seriously enough to cause leaf malformation, dwarfing or shedding, in fact, so far powdery mildew is an insignificant factor in the growth of this clone.

Unfortunately this clone is a poor yielder of latex but it is hoped to make use of it for breeding purposes by crossing it with higher yielding clones in the endeavour to obtain progeny with high yield and mildew resistance. Crown buddings at eight feet with this clone on twinned stocks of known clonal seed with a high yielding clone budded on one of the pair of twins and the resistant clone on the other were made at Hedigalla. From these crown budded trees it is intended to obtain data on the effect of this low yielding (but Oidium resistant) crown on the yield of latex as compared with the high yielding crown used for comparative purposes.

The nature of the resistance mechanism appears, from preliminary examination, to be due to existence of a thick cuticle on its leaves right from commencement of new leaf formation as contrasted to the normal thin cuticle on other clones during the early stages of leaf growth. The absence of this cuticle development on other clones during primary leaf maturing is probably the reason for their susceptibility to the disease during new leaf formation. This matter will be further elucidated on the arrival of an oil immersion microscope lens without which critical examination and measurement of leaf cuticle development is impossible. This lens is also essential for laboratory investigation of fungi in general and Oidium in particular. The present lenses are unserviceable.

Visits have been paid to estates in various districts in order to gain first hand information of growing conditions in the rubber producing areas and to discuss mildew and general rubber problems with practical planters.

Weather records during Oidium seasons for a number of years have been studied and support for the general theory of necessary conditions for powdery mildew germination and growth, mentioned previously, found.

Action has been taken to put the reference section of the library in regard to mycology in working order and essential journals, subscriptions to which had been discontinued are now coming to hand.

In December the general work of the mycologist (position vacant) was undertaken and the advisory work of a mycological nature has been carried out since then and several estate visits have been made in this regard. In many cases identifications of fungi have been difficult owing to the absence of reference literature on systematic mycology without which definite diagnosis of other than the common well known fungi cannot be carried out. Even in the case of common fungi it is difficult and dangerous to give them a definite name in the absence of the standard descriptions of the fungi concerned as there are so many species closely allied to those of economic importance with which those of pathological interest are liable to be confused. For the efficient working of this section a standard work on systematic mycology is an essential tool which cannot be dispensed with.

Several visits to estates have been made in connection with general mycological problems and pathological conditions of *Hevea brasiliensis* in general. Of interest in this regard is the iron deficiency chlorosis attributed to highly acid soil conditions mentioned above.

No mycological assistant exists on the staff and much time will be consumed in 1950 in training a laboratory technician, should one become available, to prepare material for laboratory examination and to work on the simpler aspects of Oidium and general mycology.

Power and hand spraying equipment which will be of value in Oidium control experiments and for general use have been either put in working order or obtained and a modern microtome and microscope and other laboratory equipment ordered in preparation for field and bench investigations and trials. The photographic dark room has been made usable, ready for photo-micrographic and general photography. Essential laboratory equipment in unserviceable condition is being put in order as parts ordered come to hand.

Minor trials with a hormone type weedkiller have been carried out and promising results obtained in regard to the eradication of *Mikania scandens*.

CHEMICAL DEPARTMENT.

Report of Research Assistant, Chemical Department.

(M. S. Wijeratne).

The attempts to characterise the yellow colouring matter in clonal latices initiated during the closing months of 1948 were continued, but met with no success. Removal of the pigment in crepe by the use of chemicals without any harmful effects on the rubber was also not achieved. A sample of fractionated yellow crepe was sent on request to the London Advisory Committee which is continuing the work. The work in our laboratories did not agree with the results of Fullerton and Eaton in Malaya in 1929 showing the pigment to be an uncombined member of the carotenoid group.

Our work failed to find a suitable fungicide as effective as paranitrophenol, yet free from the discolouring effect of the latter on crepe.

Efforts were made to produce a stable concentrated latex using formalin with accessory materials.

The suggestion of the visiting representatives of certain American manufacturing firms to incorporate carbon black into rubber, by addition to the latex before coagulation, was found to be impracticable owing to the inability to get an uniform dispersion of the black in the latex.

Owing to the attention focussed on the possibility of using rubber-bitumen mixtures for building roads, attempts were made to produce a rubber powder using Lissolamine Cationic soap. The experiments were not successful.

Lissolamine was also used in the trials to obtain uniform coatings of rubber on coconut fibre with a view to producing coir rope with improved tensile strength.

Shippers' complaints that top-grade rubber showed a marked deterioration in colour with the appearance of dark spots on storage led to experiments being carried out to ascertain the causes of this discolouration. Coagulation trials were carried out with locally manufactured D.C.I. acid and imported Canadian acid, with varying quantities of sodium bisulphite and Teepol. These trials confirmed the known fact of discolouration due to the inadequate use of bisulphite and showed that Teepol used in excess also causes some darkening of the crepe. They were however unable to throw any light on the cause of the discolouration complained of by the shippers. Though microbiological activity is the suspected cause, there is no confirmatory evidence to support this view.

During the first half of the year most of the estate inquiries were restricted to pre-coagulation in the field. The second supplement to Advisory Circular No. 17 was revised and issued out.

The writer visited Clara Estate, Avissawella, on inspection during the course of the year.

The post of Chemist was vacant throughout the year.

Additional Comments.

The very high price differential obtaining between smoked sheet and crepe led to certain difficulties which remain unsolved. About the middle of the year there were many complaints that crepe was showing marked deterioration in colour while in transit from Ceylon to its destination overseas.

This deterioration was of two types. The first was the development of coloured patches due to fungi; the second, and more serious type was a general darkening in colour throughout the whole sheet. Enquiries indicated that crepe from old established factories was relatively immune from these troubles and that "bought" latex factories were the worst offenders. The degeneration in ground colour appears to be associated with stale latex, i.e. latex which is not coagulated until some hours after tapping. The only preventative so far discovered is mercury in the form of a soluble salt. Fractionation of the 'stale' latex led to a very good product initially, but did not stop discolouration in storage. The Scheme has advised producers of Crepes to get the latex coagulated as soon as possible. Estates on which the morning latex is coagulated by midday maintain a better product than those which do not coagulate before evening.

A further cause of trouble — particularly the coloured patch type appears to lie in the mixing of laces from several batches of coagulum especially when these represent several days' collections.

Generally speaking, it would appear that the discolourations complained of arise as a result of departure from standard procedure. Many of these departures are economy measures, in the first place, such as increasing tapping tasks, leading to late latex collection, and resulting in crepe liable to discolour.

SOILS DEPARTMENT.

Report of Acting Soil Chemist.

(C. A. de Silva).

TABLE I.

Mean Girth in Inches

	o	n	p	k	np	nk	pk	npk	Mean
1949	23.65	23.93	26.08	22.70	26.63	25.09	26.21	26.61	25.11
1948	23.18	23.31	25.63	22.24	26.16	24.70	25.94	26.43	24.70
Increase 1948/49	0.47	0.62	.45	0.46	0.47	0.39	0.27	0.18	0.41

Owing to the introduction of a new measuring tape it will be necessary to increase the increment figures in each treatment by 1.01 inches, which is the correction for the range of girth measurements in 1949 compared with the tape used in 1948. The actual rate of growth in this area has, therefore, been satisfactory.

The total response for 1949, factorially, is as follows:—

Mean	N	P	K	Sign. response (.05)
25.13	+0.91	+2.54	+0.08	±0.96

The yield figures for 1949 based on one sample tapping per month are summarised in Table II, together with the total response to N, P, and K treated factorially in 1948, and 1949. Yield of one plot in the NPK treatment lost by fire has been calculated by the missing plot technique.

TABLE II.

Yield in grams of dry rubber per tree per tapping

o	n	p	k	np	nk	pk	npk	Mean	Error	Sign. diff. (.05)
29.8	28.6	36.2	23.3	33.2	29.1	31.4	34.7	30.8	2.6	7.5

Total Response

	N	P	K	Sign. Response (.05)	Sign. Response (.01)
1948	−0.18	+4.23	−0.49	±2.36	±3.16
1949	+1.23	+6.18	−2.33	±3.76	±5.04

The error of the experiment in 1949 is of a higher order than that in 1948, but the total response figures show that the phosphate effect is still increasing. The response to nitrogen in 1949 has a positive response compared with the previous year, but it does not receive the necessary statistical support for confirmation as significant. The indication of some response to nitrogen is, however, interesting at this stage of the experiment.

The yields converted to pounds per acre on the basis of 105 trees per acre for this particular clearing and 146 tappings per year are given under with the cumulative yields 1944-1949.

Pounds of dry rubber per acre

	o	n	p	k	np	nk	pk	npk
1949	1000	958	1214	779	1112	974	1053	1164
1944-49	2908	2691	3633	2265	3704	3027	3498	3616

Total Response in lbs. per acre

	N	P	K
1944-49	+184	+890	−133

The response to phosphate shows that the main benefit is still from yields of the better grown trees in the plots manured with phosphate, after 6 years of tapping. The trees in these plots reached tappable girth earlier than in other plots and are therefore ahead in tapping age as well.

1936 Replanted Area, 9½ acres, Nitrogen level Experiment.

This experiment was started in 1948; 3 treatments are replicated 9 times consisting of a control and nitrogen at two levels; 30 lbs. per acre and 60 lbs. per acre per year as sulphate of ammonia.

Manuring according to experimental requirements was carried out in September 1948, and April 1949.

Yield results based on one sample tapping per month on S/2, d/2, 100% are summarised in Table III.

TABLE III.

Yield in grams per tree per tapping.

	Control	30 lbs. Nitrogen	60 lbs. Nitrogen
Preliminary year, 1948.	21.8	22.1	23.1
Experimental year, 1949.	26.7	27.5	28.0
Increase '48/'49.	4.9	5.4	4.9

There are no indications up to the end of 1949 of any differential response in yield of any practical value to the manuring treatments.

1941 Replanted Area, 6½ Acres, Dartonfield — Placement of Fertilisers.

In this experiment R400 (NPK) mixture was applied by 4 methods as follows:—

1. Broadcast
2. Forked in
3. Placed in pockets
4. Potash and Phosphate placed in pockets, Nitrogen as sulphate of Ammonia broadcast.

There are 6 replications of each treatment with 18 tree plots. Manuring according to experimental requirements was carried out in September 1948, and May 1949. The yield results for the year 1949 are given under:—

Yield in grams per tree per tapping, 1949.

One sample tapping per month on S/2, d/2, 100%

Treatment ...	1	2	3	4
Yield ...	26.8	28.2	26.8	27.8

The plots allocated to the various treatments in each block were approximately equalised for growth. It would be premature to comment on the yield figures in the first year after the commencement of the manurial treatments. The differences in 1949 are, statistically, not significant.

1947 Replanted Area, Dartonfield, Manuring of Individual Backward Plants.

4 tree plots equalised for growth within each replication were used in this experiment with seedling and budded trees, which were backward in growth. Each treatment is replicated 9 times in seedlings and 8 times in budgrafts. The girth measurements of well grown trees were recorded at the same time for comparison. The treatments were as follows :—

Well grown trees.

A ... ... No fertiliser.

Poor grown trees.

B ... ... No fertiliser.
C ... ... R215 twice a year with R.R.S. rates.
D ... ... R215 monthly applications with R.R.S. rates.
E ... ... Super and Ammonium nitrate, monthly doses.
... F ... ... Animal meal + R215 twice yearly.
G ... ... As C plus wood-ash.

The treatments commenced in April 1948 and girth measurements were taken in March 1949, and October 1949. The results are summarised under :—

Average Girth in Inches.

Seedlings.

	A	B	C	D	E	F	G
March, 1949.	6.98	5.67	5.96	6.46	6.33	5.92	5.91
October, 1949.	10.13	8.39	8.78	9.87	9.61	8.99	9.24

Budgrafts.

	A	B	C	D	E	F	G
March, 1949.	4.79	3.67	3.51	3.82	4.10	3.85	3.82
October, 1949.	7.14	5.17	5.38	6.44	6.14	5.42	5.46

Compared with the control B of the backward trees, manuring in general has improved growth but treatments D and E have been the most effective in bringing up the standard of the backward trees approximately to the level of the growth of the best grown trees in Treatment A. The indications are that soluble inorganics applied 'little and often' are the most effective. The labour for frequent distribution in large commercial areas will, however, be a limiting factor.

Manuring of Budded Rubber in Tapping, Woodend Estate, Dehiowita.

This experiment covers 50 acres and plots were marked on the basis of a tapping task. 6 treatments are replicated 6 times. The budded rubber in this area was planted in July, 1940, and first tapped in March, 1946. Experimental manuring was carried out in November, 1948, and August, 1949. The 6 treatments are recapitulated under :—

1. Nitrogen 20 lbs. per acre per year as sulphate of ammonia.
2. Nitrogen 40 lbs. per acre per year as sulphate of ammonia.
3. N + P, 20 lbs. N + 15 lbs. P_2O_5 per acre per year.
4. N + P + K, 20 lbs. N + 15 lbs. P_2O_5 + 8 lbs. K_2O per acre per year.
5. Organic + Inorganic + Animal meal and sulphate of ammonia equivalent in nutrients to treatment 4.
6. Control no manure.

The yields for the year 1949 are calculated on approximately 70 tappings on S/2, d 2, 100%, representing the number of normal tappings on the estate. There is unfortunately a considerable variation in numbers of trees and numbers of tappings from plot to plot. The yield results are summarised under on a per tree per tapping basis :—

Yield in grams per tree per tapping.

	N_1	N_2	N+P	N+P+K	O+I	Control
Preliminary yields 1948	33.4	35.4	34.7	33.7	33.4	33.5
Experimental yields 1949	37.4	33.8	36.1	33.4	32.8	33.1

There are no marked effects of manuring in the first year after the commencement of manuring.

ESTATE DEPARTMENT.

Report of the Assistant Estate Superintendent.

(L. Wijeyagunewardena).

DARTONFIELD ESTATE.

Acreage Statement.

	A.	R.	P.
Rubber Mature Seedling Areas	101	1	28
Rubber Replanted Areas	55	3	22
Buildings and Roads	16	3	08
Scrubs, etc.	2	2	19
Acquired Land	2	1	22
Total ...	179	0	19

Elevation — 215 feet.

Rainfall.—Rainfall amounting to 159.03 inches spread over 215 days was about average, but the distribution was abnormal. The rainfall during the first quarter was the lowest since 1940. Inter-monsoonal rains fell earlier than usual in mid-April. A heavy rainfall of 23.81 inches spread over twenty eight days was recorded in August. The highest daily rainfall for the year being 6.17 inches in August.

Rainfall figures during 1949, and the preceding year appear below :—

	1948 ins.	1949 ins.	5 years' Average ins.
January ...	7.21	6.48	6.15
February ...	5.65	0.38	4.09
March ...	11.52	5.87	11.90
April ...	13.55	19.58	13.48
May ...	17.97	18.73	14.52
June ...	24.12	16.29	19.97
July ...	6.00	12.37	9.18
August ...	9.19	23.81	15.37
September ...	14.94	10.97	11.89
October ...	22.25	24.73	24.62
November ...	19.71	13.38	14.87
December ...	10.22	6.44	11.41
Total ...	162.33	159.03	157.45

Crop.—The crop harvested for the year amounted to 93,505 lbs. which is 118.32% of the estimated crop of 78,750 lbs. and is 6,118 lbs. above that of 1948. The increase is due mainly to the intensively tapped areas introduced after the winter rest, not estimated for, and to the slaughter tapped area.

Comparative yield records of individual fields.

Field No.	Date of Planting	Acreage	Yields (lbs.) 1948	Yields (lbs.) 1949	Yield per Acre (lbs.) 1948	Yield per Acre (lbs.) 1949
1	1910	28½	13,909	16,340	488	573
2	1913	1	607	745	607	745
3	1917	24	18,672	18,268	778	762
4	1932	1¼	942	1,016	753	812
*5	1934	7¾	5,717	5,024	738	669
6	1913	46½	26,058	29,737	560	639
7	1936	9½	7,912	7,799	833	821
8	1938	16¼	11,289	11,473	694	706
9	1939	1½	1,038	1,238	833	825
10	1941	6½	1,243	1,865	182	286
			87,387	93,505		

* The drop in yield from field No. 5 was due to a reduction in tapping intensity from S/2, d/2, 100% to S/3, d/2, 67% over an area planted with the clone GL. 1. The change in intensity of tapping was made as the trees showed signs of developing Brown Bast to which this clone is particularly susceptible.

Tapping.—(a) Tapping was stopped on the 8th February for resting during refoliation and resumed on the 7th March. During this period tapping cuts were marked for a 2S 2, d 3 system on areas tapped commercially and in the experimental areas for a S/2, d 2 system.

(b) The mature Seedling Tapping Experimental Area (approx: 24 acres) which had an additional V cut on half circumference last year, and tapped on 2S 2, d/3 on intensity of 200% and tasking at 100 trees per tapper was marked for slaughter tapping. Two half spiral cuts tapped normally and two V cuts tapped upwards. All four cuts being tapped once in two days. Tapping system 2S/2, d/2 + 2V/2, tapping intensity 400% tasking at 75 trees per tapper. This area was due for uprooting in October but was tapped throughout the year.

(c) The trees in the Forestry Area (approx. 20 acres) due for replanting in 1951 were treated to a more intensive tapping system. The trees were marked with V cuts on half circumference for upwards tapping. Tapping system — 2S/2, d/3 + V/2, intensity 200% and tasking at 100 trees. Uprooting of this area was however started by the end of December.

(d) Eighteen tapping tasks were tapped throughout the winter rest period in keeping with an experiment laid out by the Botanist.

The following trees were taken into tapping during the year :—

Field No.		Acreage	No. of trees
7	...	9½	1
8	...	16¼	19
9	...	2	7
10	...	6½	125

(e) Tapping of the experimental areas was under the supervision of the Assistant Estate Superintendent. The Visiting Adviser reported favourably on the standard of tapping in general.

Tapping Averages.

	Commercial Tapping (s'dling) 2S/2,d/3 (without Sundays)	Expt. Budded Areas S/2, d/2 (without Sundays)	Upwards tapping (Seedlings)	
			2S/2,d/3 +V cuts	2S/2,d/2 +2Vcuts
Mean for 1st Quarter	8·64 lbs.	9·87 lbs.		9·61 lbs
do 2nd do	9·79 ,,	9·40 ,,	8·21 lbs	9·57 ,,
do 3rd do	9·20 ,,	11·10 ,,	9·53 ,,	8·33 ,,
do 4th do	10·00 ,,	12.50 ,,	10·90 ,,	7·40 ,,

Analysis of tapping rounds for 1949 (1948 figures in brackets).

	Wintering	Early Tapping	Late Tapping	Very late Tapping	Washouts	Partial Washouts	No. Tapping Rain	No. Tapping H'days
1st Quat.	24 (33)	58 (56)	3 (5)	— (—)	— (—)	—(—)	—(—)	13 (8)
2nd ,,		45 (47)	8 (4)	6 (9)	— (—)	—(6)	14(14)	18 (17)
3rd ,,		41 (49)	15 (8)	7 (10)	— (2)	—(—)	15(9)	14 (14)
4th ,,		64 (54)	5 (14)	2 (7)	— (—)	—(—)	5(2)	16 (15)

Manufacture.—The crop was prepared in the form of crepe. A summary of the grades is given below :—

	1st Qrt. lbs.	2nd Qrt. lbs.	3rd Qrt. lbs.	4th Qrt. lbs.	Total lbs.	% lbs.
Pale Crepe No. 1	10,741	11,459	12,558	18,247	53,005	56·69
do No. 2	228	5,528	5,224	1,616	14,656	15·68
do No. 3	784	1,242	2,788	4,930	9,744	10·42
Expt. Latex	5	44	113	66	228	0·24
Scrap Crepe No. 1	2,290	3,355	3,610	4,045	13,300	14·22
do No. 2	—	784	1,344	444	2,572	2·75
	16,108	22,412	25,637	29,348	93,505	100·00

Factory.—Routine attention was paid to sundry repairs of the factory and the painting of machinery, during the resting period. The roof of the Factory was painted with aluminium paint.

Machinery.—The consulting Engineers Messrs. Hammond & Co. made their annual inspection of machinery and electrical equipment in March.

(a) **The New National Engine — 90 H.P.**—The wiring of the Switch Board was completed and the Engine ran on the 6th of January 1949. It has been in daily use since then.

(b) **Lee Howl Pump.**—A 4 in. × 3 in. Lee Howl Pump capable of an output of 2,290 gallons of water per hour against a 230 ft. head consuming 5 H.P. was received in March, and was fitted up by the Estate.

(c) The armature of the air compressor motor was burnt out and was rewound.

(d) An accident occurred in the 26 in. water cooled smooth mill, driven by a 25 H.P. electric motor, which has its front roll of mild steel, its back roll of soft iron and its end gears in the ratio of 27:29. Two adjacent teeth of the smaller pinion snapped together with one safety bush. The safety bush was replaced and uneven gears of the ratio 17:34 were employed in place of even gears with no interference to manufacture.

(e) **20 H.P. Gardner Engine.**—Decarbonizing of this engine was done by Messrs. Walker & Greig Ltd. in November. New piston rings, big end bearing and starting valve head and sleeve were fitted.

(f) **Experimental Mills.**—A new 5 H.P. 1,400 R.P.M. D.C. Lancashire motor complete with starter was fitted to these mills. The old motor will be used in conjunction with a new Myers Bulldozer pump.

Fuel Consumption.

Details of fuel consumption for the period January-December are given below :—

New National Engine — 90 H.P.		Average per hour
Diesel oil	... ...	1.69 gallons
Lubricating oil	... ...	...0.18 „
Rustom Hornsby — 52 H.P.		
Diesolene	... ...	2.02 gallons
Lubricating oil	... ...	0.12 „
Gardner Engine — 20 H.P.		
Lubricating oil	... ...	0.07 „
Diesel oil	... ...	0.64 „

Pests and Diseases.

Oidium.—Favourable dry weather considerably inhibited the activities of Oidium. The incidence of the disease which was exceptionally severe last year was comparatively mild this year. In the old seedling Rubber, only the late winterers were infected. In the budded areas, many clones refoliated satisfactorily without Oidium infection. The late winterers which had a sustained attack during the susceptible period ultimately refoliated with an unhealthy canopy.

Three rounds of sulphur dusting at 4 lbs. per acre were carried out at intervals.

Phytopthora — Leaf fall.—During the very wet period of August to October the old seedling rubber was affected by Phytopthora leaf-fall which was pronounced though scattered. The incidence on budded rubber was negligible.

Fomes Lignosus, 1947 Replanted Area 11 acres.—Twenty four cases were detected in 1948. A total of 44 Fomes patches scattered throughout the field received careful attention under the supervision of the Botanical Department. The history of this clearing was reported last year by the writer.

Other diseases such as Ustulina and canker were not sufficiently severe to warrant any special attention other than routine methods of control.

Disinfectants.—Application of 10 per cent Brunolinum Plantarium and Cargillinium B were made to tapping cuts.

Manuring.—The replanted clearings were manured in accordance with the programme detailed for the year.

Weeding.—In good order.

Attention was given to the control of natural covers, except in the "Forestry Area." Indigenous erect covers and self sown rubber seedlings were lopped.

Cover Crops.—A good cover crop was maintained in all the clearings.

50 Acres Replanting.—Under the instructions of the Director the uprooting of 50 acres old seedling rubber comprising of the Forestry area and the 24 acres of the mature seedling tapping experimental area was started in late December. The 24 acres was slaughter tapped and ready for uprooting in October. The Forestry Area was partially intensively tapped during the year as it was only due for slaughter tapping in 1950.

Roads and Paths.—Estate roads and paths were maintained in reasonably good order throughout the year.

Buildings.—Maintenance of buildings which comes within the purview of the Estate Department received attention.

New Buildings :—

1. Two Double roomed cottages for Labourers.
2. Two water sealed Latrines.
3. Two Garages.

Major Repairs.

(a) **Cattle Bridge.**—Three of the main wooden beams, supporting eighteen galvanised iron pipes 1¼ in. diameter of this bridge had deteriorated, rendering the bridge unsafe for vehicular traffic. Two eight inch iron girders were substituted. The girders were fixed with concrete to the two abutments built of dry masonry. The pipes were fitted in situ with 'hold fast' clips.

(b) **Tennis Court.**—This was renovated.

(c) **Junior Staff Bungalows.**—The flights of steps to these bungalows were renewed and cement pointed masonry was resorted to in an effort to prevent frequent repairs to these steps.

Bungalow.—Lighting.

1. The Secretary-Accountant's bungalow was rewired satisfactorily by Messrs. Bousteads Ltd.

2. **Junior Staff Bungalow lighting and overhead Transmission Line.**

(a) **Bungalow Wiring.**—Messrs. Walker & Greig Ltd. commenced wiring in May and completed it in July. Each bungalow has seven lighting points and one plug. An insulation test was carried out by the Supervising Engineer and the results were satisfactory.

(b) **Transmission Line.**—The routine formalities of correspondence and interviews were responsible for the delay in the release by the Ceylon Government Railway of 35 old steel rails weighing 80 lbs. per yard. Rails were transported to Dartonfield Estate from Katukurunda and Kalutara. Railway Station. A protective coating of black bituminous paint was given to the rails. The posts were drilled at Dartonfield, according to specifications, for fixing of cross arms. Holes were dug to specification along the route approved by the Supervising Engineer. One hundred and twenty seven Rubber trees were uprooted to clear the route. Considerable difficulty was encountered in obtaining the required depth of hole in the rocky areas. The heavy rains from August to October severely handicapped the progress of work.

An underground cable was laid from the Factory to the first outgoing post. The installation was however completed in early December.

Verification of Stores.

The verification of estate stores for the year ending December 1948 was carried out.

Rejected Articles.—Tools rejected after the annual verification of stores were buried according to requirements.

Labour.

(a) The eight hour day for tappers was introduced in April 1949 and fourteen of the casual labour discontinued. It is encouraging to note that the labour are alive to the present economic conditions affecting rubber as proved by the excellent turn out of tappers on the eight hour day system. Labour was sufficient and settled. Details of labour on checkroll at the end of the year were as follows :—

	Resident.	Non-Resident.
Ceylonese ...	17	45
Non-Ceylonese ...	50	—

(b) **Annual Holidays.**—Holiday pay was given to all labourers entitled to holidays in accordance with the Wages Boards Ordinance.

(c) **Maternity Benefits.**—Five Ordinary Maternity Benefits and one Alternative, payments were made during the year in accordance with the Maternity Benefits Ordinance.

(d) **Labour Inspection.**—An Inspector of the Labour Department visited on the 25th October 1949 and inspected check-rolls, Labour Registers and all relevant Labour Returns.

Health.

The health of the labourers has been moderately good. The following cases of diseases have been reported among the Staff and Labourers for the year :—

Influenza ...	215
Malaria ...	84
Ulcer ...	116
Anchylos ...	7
Worms ...	108
Others ...	187
	717

All resident and non-resident labourers were given Anchy Treatment in December.

NIVITIGALAKELE ESTATE.

Acreage Statement.

	A.	R.	P.	A.	R.	P.
Rubber in Tapping ...	103	3	37			
Rubber not in Tapping ...	32	3	39	136	3	36
Seedling Nurseries ...	7	1	37			
Budwood Nurseries ...	6	2	07			
Buildings and Roads ...	2	0	00			
Uncultivated ...	21	1	00	37	1	04
				174	1	00

Rainfall.

Rainfall	...	143.16 inches.
No. of wet days	...	188

The rainfall for the year was about average.

Crop.—The Crop secured for the year was 67,928 lbs. which is 115.5% of the estimated crop 58,800 lbs. and is 3,368 lbs. above that of 1948. The younger clearings in tapping gave improved yields and continue to show good promise.

Comparative yield records are given below for the year:—

Clearings	Acreage	Crop in lbs. 1948	Crop in lbs. 1949	Yield per Acre 1948	Yield per Acre 1949
1926					
1927	39½	35,544	33,621	899	852
1928					
1935	28	18,181	18,111	649	646
1939	10	4,728	6,151	472	615
1940	9½	3,460	4,744	364	499
1941	*14	2,196	3,550	313	507
1942	5	—	876	—	175
1940 Deniya	3	458	875	152	291

*7 acres in tapping.

Tapping.

(a) Tapping was stopped on the 10th of February for resting during refoliation, and resumed on 1st March.

(b) A winter rest experiment laid out by the Botanist caused the tapping of 15 tasks throughout the winter rest period.

(c) The marking of tapping panels for a 2S/2, d/3 system, on a bark consumption of 4½ in. was carried out on an acreage of 39½ from the 1926, 1927 and 1928 clearings. The remaining acreage under tapping was marked for a S/2, d/2.

(d) The following trees were taken into tapping during the year:—

Clearing		No. of trees
1928	...	1
1939	...	17
1940	...	28
1941	...	60
Deniya 3 acres	...	37

(e) The Visiting Adviser commented favourably on the standard of tapping in general.

Tapping Averages.

Average intake per tapper (Mature Clearings) — 15.7 lbs.
do. do. (Younger Clearings) — 11.7 „

Analysis of tapping rounds for 1949 (1948 figures in brackets).

	Early Tapping	Late Tapping	Very late Tapping	Wash-outs	Partial Washouts	No. Tapping Rain	No. Tapping Holidays
1st Qr.	70 (54)	5 (7)	— (—)	— (—)	— (—)	— (—)	15 (4)
2nd Qr.	44 (43)	6 (14)	— (—)	2 (1)	— (—)	23 (17)	18 (17)
3rd Qr.	46 (51)	17 (14)	— (—)	1 (1)	— (—)	16 (14)	13 (13)
4th Qr.	52 (43)	20 (26)	— (—)	— (1)	— (—)	5 (8)	15 (15)

Manufacture.

Rubber coagulam was daily transported to Dartonfield Factory for manufacture into crepe. The distribution of grades is given below:—

	1st Quart.	2nd Quart.	3rd. Quart.	4th Quart.	Total	%
Pale Crepe No. 1	8,283	7,153	9,143	10,813	35,392	52.10
do. No. 2	3,084	2,233	3,379	3,176	11,872	17.48
do. No. 3	992	561	1,614	4,503	7,670	11.29
Scrap Crepe No. 1	2,145	1,598	2,449	3,330	9,522	14.02
do. No. 2	—	715	1,463	958	3,136	4.62
do. No. 3	224	110	2	—	336	0.49

Machinery.

5 H.P. National Engine.—This engine which failed in December 1948 was sent to the Agents for complete overhaul and repairs and was received in February 1949. The break down caused the replacement of a set of Piston rings, a brass gudgeon pinion bush, besides the facing and grinding of valve and valve seats, welding and fitting of governor housing and fitting of all governor parts except the two governor weights. The engine worked satisfactorily.

Pests and Diseases.

(a) **Oidium.**—The attack of Oidium was not as severe as in 1948. The Kosgahahena clearings of 1939, 1940 and 1941 wintered evenly. In mid-February two rounds of sulphur dusting were done in all the clearings, and a third round in early March using 6 lbs. per acre per round.

(b) **Phytopthora. Stem disease.**—A mild attack was observed in July in the Budwood Nursery. Perenox was sprayed which arrested the spread.

(c) **Fomes Lignosus.**—A few plants of the 1946 replanted area succumbed. These were uprooted and routine measures of control adopted.

Disinfectants.

Application of 10 per cent Brunolinum Plantarium and Cargillinium B were made to tapping cuts on wet and dry days respectively.

Loss of Trees.

The following trees were uprooted in 1949:—

	1926	1927	1928	1935	1939	1940	1941	1942	1944	1946
Brown Bast	2	5	—	—	—	—	—	—	—	—
Ustulina	3	2	3	5	1	—	—	—	—	—
Fomes	—	—	—	—	—	—	—	—	—	5
Wind Damage	7	3	5	21	7	2	5	2	1	2
Cart Road	1	—	—	—	—	—	—	—	—	—

Weeding.

Routine weeding of all clearings were done.

Cover Crops.

The well established cover crops of Desmodium Ovalifolium were maintained. A large acreage 1935 clearing when grass had competed with the old cover smothering the latter, cuttings of Desmodium Ovalifolium were planted while eradicating the grass.

Manuring.

All clearings and nurseries were manured in accordance with the manuring programme for the year. The backward plants in the 1943 and 1946 clearings were manured in December with R.200.

1943 Clearing, Pinnagoda — 7 acres, Hard and Soft Rubber.

In June, the first of three monthly slashings of the heavy undergrowth was mulched on the platforms in an effort to stimulate soil activity as recommended by the Visiting Adviser. Thirty six stumped buddings were supplied to fill the vacancies in the clearing. The second and third slashings were done in September and December.

Nurseries.

(a) In January, beds previously occupied by H.P. Seedlings were prepared to hold about 10,000 Moneragalla illegitimate seeds. Green manure was mulched and the beds manured with R.215 at 4 ozs. per square yard. In February, 7,843 illegitimate clonal seeds were received from Moneragalla and were put out for germination, 5,429 germinated seeds were planted in the beds prepared in January to receive the seed. These seedlings were spaced 1 ft. × 1 ft. and watered daily, morning, evening, during the dry weather.

(b) Eleven clones required for planting in the 1949 clearing at Hedigalla were budded in the Nursery in May. 1,850 budded stumps were uprooted and despatched to Hedigalla in July.

(c) During the third quarter 19,477 illegitimate seed of TJ. 1 were received from the following Estates and germinated and planted in the Nursery :—

Dalkeith	...	12,024	Ellakande	...	103
Palmgarden	...	966	Mirishena	...	818
Yatadola	...	428	Waljapola	...	2,791
Kiriporuwa	...	425	Kepitigalla	...	1,922

(d) Routine attention was paid to the weeding of all nurseries during the year.

Roads and Paths.

Surface repairs to the approach road were effected. All minor estate roads and paths were reasonably maintained throughout the year.

Buildings.

1. A well was sunk for the use of labourers at Pinnagoda.
2. Repairs to the cement floor in the coagulating shed.
3. White washing and tarnapping of all bungalows and attention to minor repairs were done.

Labour.

The eight hour working day for tappers was introduced in April 1949. Details of labour on Check Roll at the end of the year were as follows :—

	...	Residents	Non-Residents
Ceylonese	...	20	35
Non-Ceylonese	...	2	—

HEDIGALLA ESTATE.

Acreage Statement.

New Clearings.

1943	Clearing	...	11 acres.
1944	„	...	14 „
1945	„	...	25 „
1946	„	...	16 „
1947	„	...	60 „
1949	„	...	35 „
			161 acres.

The total acreage available is 1,000 acres.

Rainfall.

Rainfall	...	181.48 inches
No. of wet days	...	219

The rainfall for the year was 15 inches above that of 1948. Heavy rains fell in May, August and October.

1943 Clearing.

The Legitimate Seedling and clone Trial 11 acres was slow in reaching tappable girth. A reasonable percentage of the seedling area will be ready for tapping in March 1950.

1944 Clearing.

In the stem/branch budding and small scale (14 acres) growth was satisfactory.

1945 Clearing — 25 acres.

The crown budding over an area of 12 acres of this clearing commenced in Mid March. 1,194 buddings were made at heights of five and eight feet in keeping with the layout of this experiment. Budwood from the Nivitigalakele Nurseries and Dartonfield were used. As a low percentage of success was attained, a second round of budding was carried out in September and October with better results. The lopping of the top budded trees were carried out in December.

1946 Clearing. ...

The growth and foliage in this clearing improved considerably after the application of R.215 manure in place of saphos as recommended by the Visiting Adviser.

1947 Clearing.

The growth in this clearing was good. Four hundred and thirty twinned seedlings planted in June 1948 were top budded with LCB. 870 in November. The cover crop of Desmodium Ovalifolium is well established.

1949 Clearing.

Thirty five acres were cleared employing estate labour for the layout of a large scale clone trial consisting of 31 varieties in blocks of six replications of 25 tree plots. The distance of planting rows 6 ft. × 45 ft. giving 161 points to the acre. Holes were cut 2½ ft. × 2½ ft. × 1 foot to accommodate the lateral root system with a centre hole of 3 ft. made with a crow bar to take the tap root. Silt pitted drains were spaced 45 ft. apart. All soil conservation earth works were carried out as necessary. A good cover crop of Desmodium Ovalifolium has been established. Useful inspection paths were cut. The good timber from the clearing was sawn and transported to Dartonfield.

Planting commenced on the 5th July. 4,664 budded stumps were planted and protecting baskets purchased locally were used. The planting material was made up of 2,814 stumps of 19 clones budded in April in the Hedigalla Nursery and 1,850 stumps of 12 clones budded in the Nivitigalakele Nurseries. The Station Waggon was used for transporting the stumps from Nivitigalakele.

Weather conditions were favourable for planting and a good percentage of stumps were observed to have sprouted by the end of July. In October all plants were manured using 4 ozs. saphos per plant,

Pests and Diseases.

A mild attack of Oidium confined to a few trees in the 1943 and 1944 clearings was observed in February.

Buildings.

A coagulating shed was built.

Water Supply.

Pipe borne water supply and drainage was laid to the Estate Office.

Maintenance of Cart Road.

The maintenance of the first two miles of cart road proved inexpensive in 1949. The padlocked iron gate which was erected in April 1948 helped the arrest of heavy traffic on this road.

3rd Mile — Extension of Cart Road.

The sixth half mile was completed by the end of March.

FOOD PRODUCTION IN THE ESTATES.

Nivitigalakele	...	½ acre paddy.
Hedigalla	...	Pine apples.

Crop harvested.

Paddy	...	106 measures
Pine apples	...	4716
Manioc	...	149 lbs.

Visiting Adviser.—The Visiting Adviser, Mr. W. A. Paterson inspected Dartonfield, Nivitigalakele and Hedigalla once during the year and reported favourably on the condition of the estates.

Superintendent.—Dr. E. Phillis succeeded Dr. Edgar Rhodes in July, 1949.

SMALL HOLDINGS DEPARTMENT.

Report of the Smallholdings Propaganda Officer.

(W. I. Pieris).

Essential preliminary work arising from the taking over of the New Rubber Planting Scheme and general advisory work among Rubber smallholders comprised the principal activities of the Department during the year. The entire staff both field and office, have been kept extremely busy throughout and, at times, called upon to undertake considerably more than their normal share of work. The writer wishes to place on record his appreciation of the cheerful and unquestioning co-operation received from all grades of officers, which alone has made possible the extensive field of work covered during the year. In fact the progress made has been so satisfactory that the end of the year saw the work of the N. R. P. S. completely re-organised and set on an efficient footing while the general advisory services of the Department were increasingly recognised and sought after by Rubber smallholders.

Staff.

The Department functioned with its full staff of one Smallholdings Propaganda Officer (the writer), 3 Assistant Propaganda Officers, 4 District Field Officers, 31 Rubber Instructors, 5 Clerks (including one at Dartonfield) and 2 peons. Messrs. K. W. de Silva and H. H. Peiris, Assistant Propaganda Officers, who had been temporarily working at Headquarters

in Colombo took up their permanent stations at Agalawatta and Getahetta on March 14th in charge of the southern and northern sectors respectively while the Senior Assistant Propaganda Officer, Mr. N. W. Palihawadana, was retained in the Colombo office. 5 Rubber Instructors, the Accounts Clerk and one peon left the Department during the year and were duly replaced. All staff received the new enhanced salary scales from January 1st.

The staff of 2 Assistant Propaganda Officers, 2 District Field Officers, 24 Rubber Instructors and 1 clerk taken over from the N.R.P.S., satisfactorily completed their year of probation on September 30th except for 1 District Field Officer and 4 Rubber Instructors whose probationary period had to be extended by 6 months as their work was not up to the required standard.

As the payment of varying mileage rates according to the vehicle used offered an unfair temptation to Rubber Instructors to go in for cars which they were not in a position to maintain, it was decided to pay all Rubber Instructors a rate of 15 cents a mile as from 1st January 1950, irrespective of the kind of vehicle they used. 15 cents is the mileage rate allowed for a motor-cycle, which is considered by the Board to be the appropriate conveyance for an officer of the grade of a Rubber Instructor.

Loans were given by the Board to 2 Assistant Propaganda Officers and 2 District Field Officers to buy cars and to 3 Rubber Instructors to buy motor-cycles.

A staff conference of all Assistant Propaganda Officers and District Field Officers was held on March 18th for explaining the census-taking of N.R.P.S. permit-areas and another on November 7th, at which the Director was present, for discussing Departmental matters. The latter proved of great help in clarifying various problems about which officers were in doubt and needed information.

Survey of N.R.P.S. Holdings.

On taking over the work of the New Rubber Planting Scheme in October 1948 it was found that, although the Scheme had been in existence for the past 10 years and permits had been issued for some 45,000 acres comprising about 20,000 holdings, no information or records were available to show how many of these holdings had been actually planted and what proportion of them budded, soil-conserved and otherwise provided for as required by the New-Planting Ordinance. A complete survey of each holding was, therefore, begun in March with a view to separating holdings that are likely to make satisfactory plantations in the future from those that are beyond redemption and recommending to Government that no further funds be expended on the latter. The work entailed was of an arduous and extensive nature and occupied the greater part of the Instructors' time during the rest of the year. A specially-prepared census form which supplied detailed and comprehensive information regarding existing conditions on each holding was filled up by Instructors who visited every holding personally, and a total of 18,767 holdings were completed from March to December. The work often entailed miles of walking and climbing under very difficult conditions, sometimes in wet weather and without proper food, and a very good job of work has been done by the field staff. The accuracy of the information collected was checked in the field by Senior Officers (Assistant Propaganda Officers and District Field Officers) in respect of a certain number of holdings selected at random each month. The survey will be completed early in 1950 and will afford much useful statistical information regarding budded smallholdings in Ceylon besides revealing their present condition. The survey classifies each holding into

one of three grades according to growth as shown by the average girth of trees and those in grade 3 are considered unlikely to make satisfactory future plantations.

During census visits the opportunity was also seized for giving general advice on the maintenance and improvement of holdings with special reference to getting owners to begin tapping on their new budded plantations correctly and make good sheets.

Sheet Improvement.

Every effort was made to improve the general standard of smallholders' sheet by means of practical sheet-making demonstrations given by Rubber Instructors, advisory visits, building of standard inexpensive mud smokehouses, issue of mesh for strainers, etc.

Special arrangements were made with the Rubber Commissioner to get his Depot Officers to pay the best possible prices for smallholders' sheet and Instructors were directed to induce as many smallholders as possible to take their rubber to the Depots rather than to middlemen who under-pay them. Purchases at Depots have consequently increased and it is believed that a better system of grading and payment now prevails. It is essential that there should be sensible co-operation between Rubber Instructors and Depot Officers if the important object of improving smallholders' rubber is to be achieved. It should also be realised that smallowners' sheet form a considerable portion of the Dominion's rubber output and therefore cannot be ignored. Depots at which purchases were observed to be unduly low were brought to the notice of the Rubber Commissioner with a view to getting the Depot Officers concerned to improve them.

While satisfactory work has been done in building smokehouses, etc. for smallholders there are certain fundamental limitations which impede the improvement of their sheet. Chief among them is the lack of certain types of essential but expensive equipment such as rollers, which the average smallholder cannot afford to buy individually. The supply of rollers and other essential equipment like pans at prices within their means, or the establishment of a network of rolling centres by Government would be a great boon towards improving sheet. It should be mentioned here that suitable Chinese-made rollers are available in Malaya at a cost not exceeding Rs. 75/- per roller (both smooth and grooved) whereas the cheapest serviceable roller in Ceylon costs about Rs. 225/-.

70 demonstration and 206 private smokehouses were started during the year under Instructors' supervision, of which 60 demonstration and 61 private ones were completed. 248 existing houses were improved. 575 sheet-making demonstrations given. 548 sq. feet of brass mesh was sold for strainers. 845 liaison visits were made by Instructors to Rubber Depots in connection with the campaign for improving and obtaining good prices for smallholders' rubber.

The price of sheet was about 53 cents per lb. in January, steadily decreased to 46 cents in June and again improved to 72 cents by the end of the year. At the low level of 46 cents, although some big estates had to stop tapping, the smallholder, owing to his comparative low cost of production, was still able to carry on at a profit. Special instructions on the production of sheet at minimum cost were issued to smallholders in the form of a leaflet both in English and Sinhalese entitled "Rubber Production on Smallholdings." The instructions embodied were of a simple and practical form which any smallholder could carry out, and showed that a profit of 10-15 cents on a pound was still (at market price of 46 cents) obtainable even if a paid tapper was employed. The leaflet was issued free and was greatly in demand.

Co-operative Societies.

The formation of Rubber Co-operative Societies, similar to the one at Hataraliyadde inaugurated by this Department in 1942 and running very satisfactorily, is another means of improving the quality of smallholders' sheet and overcoming the difficulty of expensive equipment. Although a number of villages, notably those at Elapatha, Ganegoda, Dehigahapitiya, Ittapana, Kitalangamuwa, Kahagalla and Badulupitiya, evinced an interest in forming similar societies during the year, these enterprises invariably fell short of fruition for lack of the initial capital (of about Rs. 3,000.-) for putting up the buildings (smokehouse and coagulating shed) and buying equipment. Serious and early consideration should be given by Government or the Rubber Board to the provision of this capital in the form of loans to approved societies on easy terms. Although one would expect the Co-operative Department to help in this respect, in actual practice it has been found very difficult for prospective societies to obtain these initial funds from that source.

The Hataraliyadde Rubber Co-operative Society was regularly visited and supervised by the Rubber Instructor, Galagedera, and it has functioned satisfactorily. The quality of sheet had deteriorated slightly during one of the writer's visits and necessary instructions were given to improve it.

Considerable enthusiasm was shown by the Dapiligoda Co-operative Society to form a separate Rubber Society for dealing with members' latex on co-operative lines. On their own initiative and with the advice of the Rubber Instructor, Agalawatta, they had put up a coagulating shed, procured a pair of second-hand rollers and begun to produce sheet co-operatively. They were in urgent need of funds for building a smokehouse and, with the Director's permission, a grant of Rs. 200 was made from the smokehouse vote towards an 800 lb., standard pattern smokehouse, work on which has commenced.

The members of the Dawalhabe Co-operative Society have collected a share capital of Rs. 200 and selected a site for the buildings for forming a Rubber Co-operative Society.

Assistance to Rubber Controller.

In the absence of a field staff of his own it has fallen on this Department to assist the Rubber Controller in various capacities, which entail a considerable amount of inspection work in the field. In view of the importance of this work, if indiscriminate Rubber planting on unsuitable lands, etc. is to be prevented, it has been readily undertaken, but the time may come when an increase of staff might be necessary if these duties were to multiply.

490 preliminary reports were sent to the Rubber Controller on the suitability of lands for new-planting permits after inspection of each by a Rubber Instructor. From these inspections it was revealed that a good many lands for which permits were asked had already been planted, thereby nullifying to some extent the purpose of permits. In such cases the Rubber Controller appears to have no alternative but to give a covering permit provided the requirements of the New Planting Ordinance have been fulfilled. 1,106 new-planting permits previously issued were cancelled by the Rubber Controller on their being found neglected on inspection by our officers. A fairly large number of reports, each of which necessitates a visit by an Instructor, was also forwarded to the Rubber Controller on new-planting areas, regarding the condition of which reliable information is required for numerous purposes.

The issue of new-planting permits was temporarily suspended by the Rubber Controller during the earlier part of the year but 296 permits

comprising 612 acres were issued to peasant and middle-class new-planters later.

Soil Conservation.

Rs. 14,424/46 was paid out as soil conservation grants to 202 peasant-class new-planting permit-holders during the year. A considerable amount of money on this account has been saved by enforcing stricter supervision over the payment of these grants and by introducing a fool-proof system of measuring and checking all conservation work for which claims are received. An idea of the immense saving effected could be formed when it is contemplated that the total vote available for this purpose was some Rs. 88,000/- practically the whole of which had been paid out in grants in previous years.

Approximately 58 acres in 46 new-planting holdings, 11 acres in 7 mature holdings and 70 acres in 34 replanted holdings were lined by Instructors for soil conservation.

Replanting.

The progress made in replanting by smallholders has been very inadequate. This is mainly due to the lack of funds. Reports from Malaya show that the extent of replanting done there is considerably greater but this is probably among middle-class owners rather than the actual smallholder of under 10 acres. If, however, Ceylon is to keep abreast with other progressive rubber-producing countries by replanting with high-yielding material, the aspect of assistance to smallholders to replant their numerous over-tapped and useless plantations will have to receive early consideration. 15 holdings (35 acres) were replanted during the year.

The 6 Demonstration Replanted blocks supervised by the Department were maintained in good order and given their annual dressing of cattle manure.

Coagulants.

Tests carried out at Dartonfield on locally-made D.C.I. Acetic acid showed that this acid was suitable for sheet manufacture and that there was no deterioration on storage even after two years. Enquiries, however, showed that there was little or no sale of this product from the Government Rubber Depots. This is mainly due to the price charged being too high in proportion to its strength (imported acid of greater strength being available at about the same price) and that it is not sold in small quantities (bottles) to suit smallholders. The matter was taken up with the Department of Industries who are exploring means for supplying the acid in sealed and labelled bottles at a lower price. It was suggested that the label should show the strength, price and dose required for coagulation, which would be a help to the smallholder and also prevent adulteration by unscrupulous dealers.

Planting Material.

The policy regarding the issue of budded stumps to small-holders has been modified and clonal seedlings are now recommended as generally more suitable. No more budded stumps will be issued after the small balance stocks in the Department's old demonstration nurseries have been disposed of. 4,978 clonal seedlings and 12 yards of budwood were issued free to peasant permit-holders from the Government N.R.P.S. nurseries while 1,800 clonal seedlings and 12 yards of budwood were sold to middle-class permit-holders. 744 budded stumps were sold from old demonstration nurseries referred to above and 308 yards of budwood issued from the Nivitigalakele Experiment Station for budding their final remaining stocks.

The following clonal seedlings are available for issue in 1950 in addition to 10,000 seedlings laid down at Nivitigalakele :—

Walpita Government Farm	—	5,170 seedlings, over 2 years old
Walpita Government Farm	—	2,330 seedlings, about 2 years old
Horana Government Farm	—	1,000 seedlings, (from 1949 seed)
Ratnapura (S.H. Dept. nursery)	—	1,000 seedlings, (from 1949 seed)
Baddegama (S.H. Dept. nursery)	—	1,290 seedlings, (from 1949 seed)
Kegalla (S.H. Dept. nursery)	—	470 seedlings, (from 1949 seed)
Total	—	11,260

The demand for clonal seedlings has been small probably due to most new-planting permit-areas being already planted.

Demonstrations.

In addition to the sheet-making demonstrations referred to earlier 443 tapping, 129 disease control, 20 budding and 277 miscellaneous demonstrations were given to smallholders by Instructors.

Visits.

27,046 visits were made to new-planted holdings by the field staff, including those in connection with the census, measurement of soil conservation, furnishing information required by the Rubber Controller, general advice and demonstrations. 3,033 additional visits were made to smokehouses, 3,691 to mature holdings and 637 to replanted areas. The writer personally visited all ranges periodically.

Correspondence.

General — Inward 2,137.
Outward 1,790.

With Rubber Controller—Inward 2,267 } including preliminary reports
Outward 2,129 } and cancellation notices.

General.

Mr. L. R. Davidson, Smallholdings Advisory Officer of the Rubber Research Institute of Malaya, who was interested in studying our smallholders' smokehouses and the type of smallholdings activities carried out by this Department, visited Ceylon in February and was shown round.

Accounts in connection with staff salaries and travel claims, etc. which had previously been done at Dartonfield were taken over in August and has added considerably to the duties of the office staff.

Assistance was given and reports submitted when necessary to the Assistant Government Agents concerned in connection with the Government Rubber Allotments and Colonies of which they are in charge, notably those at Urumiwela (Kegalla District) and Kalutara.

Special report forms were prepared and printed to facilitate the sending of monthly and quarterly reports by all classes of field officers.

The Department sent exhibits to the Paddy Exhibition in May and the Annual Science Congress in December.

Audit visited the office on September 17th and 26th and found the books in order.

Advisory Services.

There is a continued demand for the Scheme's advisory services, and and the bulk of correspondence steadily increases. With the very limited staff available, it is impossible to visit all the estates where visits would be desirable, nor to spend as much time on smallholdings as I should like. It is hoped that one of the new appointments, at least, will be mainly a

'travelling officer' whose particular duty will be to familiarise himself with field problems and translate them into research problems to be investigated by the Scheme.

It is a pleasure to record the warm welcome given to the Scheme's Officers whenever they are able to get about, and the never failing co-operation given by the Rubber Industry in general to the Scheme.

The Director was appointed a member of the Central Board of Agriculture and of the Rubber Advisory Board.

Visits, etc.

With the general easing of travel restrictions after the war, there have been more distinguished visitors to Dartonfield. These include Dr. S. P. Wiltshire of the Commonwealth Mycological Bureau, Mr. Kellet of the International Rubber Study Group, M. le Bras of the French Rubber Institute, Dr. V. Emden and Mr. Reitsma of Buitenzorg and Dr. Ignetieff and Mr. Shim of the U.N.O. Several members of the Ceylon Association in London have visited Dartonfield while in Ceylon, a courtesy which is much appreciated.

The Director attended a conference on 'Improvement in Natural Rubber' held by the Rubber Research Institute of Malaya in Kuala Lumpur and there met Rubber workers from all the Rubber growing countries of the East as well as from Europe.

Co-operation with other Research Institutions :—

The Scheme keeps in close touch with the Rubber Research Institute of Malaya and with the Research Organisations in Indonesia and Indo-China. The Rubber Development Board and the Rubber Producers' Research Organisation continue to give all possible help.

There is constant communication with the London Advisory Committee for Rubber Research (Ceylon and Malaya) and it is a pleasure to record our appreciation of the speed and efficiency with which our numerous requests are dealt with.

The cordial relations existing with the Coconut Research Scheme, the Tea Research Institute and the Dept. of Agriculture in Ceylon must also be noted.

Publications :—

During the year the following publications were issued :—

1. 2nd Supplement to Advisory Circular No. 17 (Revised).
2. Supplement to the Report of the Work of the Rubber Research Board in 1947.
3. Advisory Circular No. 27 entitled "Collection and Planting of Clonal Seed."
4. "Rubber Production on Smallholdings" by the Small-holdings Propaganda Officer (issued in English and in Sinhalese).
5. Combined Quarterly Circulars for 1948.
6. Annual Report for 1948.

Finances:—

The Auditor's Report for the year will not be available for some time, but it may be stated that the Scheme's position is now much more favourable than it was a little while ago, largely as a result of the increased rate of cess and secondly from the "savings" resulting from the unavailability of Senior Staff.

The audited Balance Sheet will be published as soon as it is available.

(Sgd.) E. PHILLIS,
Director.

Research Laboratories,
Dartonfield, Agalawatta,
22-4-1950.

ESTIMATES FOR 1950

(Adopted by the Board, November 4th, 1949).

INCOME.

		Rs.
1.	Cess Collections	862,400
2.	Government Grant for Smallholdings Work ...	164,564
3.	Interest	20,700
4.	Sale of Publications	1,000
5.	Profit from Dartonfield	3,905
6.	Profit from Nivitigalakele	11,414
7.	Profit from Hedigalla ... ... (Loss)	942
8.	Sundry Receipts	2,500
		Rs. 1,065,541

REVENUE EXPENDITURE

		Rs.	Rs.
1.	**Administration of the Board :—**		
	Travelling expenses of Board Members		3,000
2.	**Personal Emoluments :—**		
	Senior Scientific Staff	121,914	
	Junior Scientific Staff	32,619	154,533
3.	**Library and Publications :—**		
	Library	4,000	
	Publications	3,500	7,500
4.	**Smallholdings Department :—**		
	Salaries and Allowances	166,402	
	Travelling and General Expenses ...	77,405	243,807
5.	**Laboratory :—**		
	Equipment and Working Expenses ...	6,000	
	Furniture Replacements ...	100	6,100
6.	**Field and Factory Experiments :—**		
	Field Experiments	4,010	
	Factory Experiments	4,746	8,756
7.	**Office :—**		
	Salaries of Office Staff	24,986	
	Stationery and Office Equipment ...	4,000	
	Postage and Telegrams	3,000	
	Advertising	1,000	
	Telephone	1,200	
	Audit	1,200	35,386
8.	**Travelling Expenses of Staff :—**		
	Officers' expenses		12,000
9.	**Maintenance of Buildings, Water and Power Supply and Station Waggon :—**		
	General Buildings	500	
	Bungalows	5,000	
	Water and Power Supply	4,000	
	Furniture Replacements	1,000	
	Station Waggon	2,500	13,000
10.	**Miscellaneous items shared with Estates :—**		
	Dartonfield General Charges ...	29,124	
	Nivitigalakele General Charges ...	15,260	
	Hedigalla General Charges	11,517	
	Upkeep of Roads and Grounds ...	1,125	
	Factory Upkeep	2,100	
	Power Supply	10,500	69,626

		Rs.	Rs.
11.	**Contingencies :—**		
	Contribution to London Advisory Committee	27,000	
	General Charges	1,000	
	Insurance Charges	5,500	
	Staff Provident Fund	54,500	
	Passages	5,000	
	Entertainment Allowance	250	
	War Allowance to Staff	57,718	
	Contribution to Medical Fund ...	3,600	154,568
12.	**Depreciation**		30,500
			Rs. 738,776

CAPITAL ACCOUNT.

Immature Areas :—			
	Dartonfield	14,039	
	Nivitigalakele	3,533	
	Hedigalla	25,500	43,072
Buildings :—			
	Junior Staff Recreation Club — Dartonfield ...	10,000	
	Renovating Buildings	12,000*	
	Water-borne Sanitation for J. S. Bungalows at Dartonfield	8,000	
	Water Supply — Hedigalla	2,000	
	Water tanks for Asst. Superintendent's and S.H.P.O's bungalows	600*	
	Electric lights for J.S. Bungalows at Nivitigalakele	3,500	36,100
Equipment :—			
	Furniture for Superintendent's bungalow, Dartonfield	5,000	
	Renovating old furniture in staff bungalows	3,000*	8,000
Roads, etc.			
	Hedigalla — extension of cart road ½ mile ...	10,000	10,000
	Dartonfield — metalling factory premises		1,000
			Rs. 98,172

* To be met from Depreciation Reserve.

SUMMARY.

Income			1,065,541
Expenditure :—			
	Revenue	738,776	
	Capital	98,172	836,948
Excess of Expenditure over Income			228,593

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